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ABSTRACT

With the current supply of fossil fuels slowly diminishing, the people of the 21st century will face a drastic change in their lives. If students become aware of the problem now, they will be able to participate in the technological and social innovations that the depletion of fossil fuel supplies will demand of society in the future. This unit plan is designed to be a thought provoking experience that will make students aware of the problem and encourage them to create innovations that will help accommodate the changes that the depletion of fossil fuels will cause. Upon completion of the lesson, the students will be able to explain fossil fuels, their sources, uses, changes that will occur because of the depletion of the supply, and innovations that could be made as a result of the depletion. The unit's five lessons begin with an introduction on fossil fuels. Students then separate into groups and brainstorm about the effects of fossil fuel depletion. Each group selects one effect for which it devises a solution. Groups brainstorm about their solutions and decide how to create models of their solutions for presentation to the class. Time is allotted for the groups to work on the projects. On the last day of the unit groups present their projects orally to the class. (Author/LBG)

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Our Changing Future: An Integrated Plan In Social And Natural Science

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Abstract

With the current supply of fossil fuels slowly diminishing, the people of the twenty-first century will be faced with a drastic change in their lives. It is important that our students today are aware of this problem because they will be the people who will eventually be confronted with it. If these students become aware of the problem of diminishing fossil fuels now they will be more able to participate in the technological and social innovations that the depletion of fossil fuel supplies will demand of our society in the future.

This unit plan is designed to be a thought provoking experience that will make my students aware of the problem of diminishing fossil fuels and its effect on our lives, as well as encourage them to create innovations that will help accommodate the changes that the depletion of fossil fuels will cause. Upon completion of this lesson the students will be able to explain what fossil fuels are, where fossil fuels come from, our current uses of fossil fuels, some changes that will occur in our lives as a result of the depletion of the fossil fuel supply, and some innovations that could be made in our society as a result of this depletion.

Five lessons comprise this unit. These lessons will begin with an introductory lesson on fossil fuels. Next, the students will separate into groups of two to four students and brainstorm about the effects that the depletion of the fossil fuel supply on our lives. From the ideas that they come up with each group will select one of the effects for which they are going to create a solution, for example, an alternative to gasoline powered vehicles. The groups will then brainstorm about their solution and decide how they are going to create a model of their solution so that they can present it to their class. This model may be a paper, a model, blueprints

or other means of conveying their idea. Time will be alotted for the groups to work on these projects. On the last day of the unit the projects will be presented orally to the class.

Purpose of Unit

At this time, petroleum, the most important of the fossil fuels, provides our world with over one half of its energy. In the year 2010 supplies of petroleum will have dwindled enough to supply the world with under one third of its energy. This is a problem of growing concern in our world today because it is no longer an issue that is beyond our lifetime, the depletion of the fossil fuel supply will directly affect the lives of the people living in the twenty-first century. For this reason, it is important that our students of the twenty-first century are aware of this problem and the changes that it will cause in our lives

Day One

Date: May 4, 1992

Grade: Five

Level: All students will participate.

Topic: Introduction to Fossil Fuels

Time Period: 80 minutes, 10:00-11:20

Objectives: Upon completion of this lesson students will be able to explain what the fossil fuels are, where fossil fuels come from, and some of our current uses of fossil fuels.

Method: Lecture, Demonstration, Active Learning

Procedure: Students will be introduced to the fossil fuels through a lecture and demonstration. The lecture will be as follows.

"Today we are going to start a new unit about fossil fuels. (The teacher writes "Fossil Fuels" on the chalkboard.) Raise your hand if you have heard of the fossil fuels. Tracey, you have your hand raised, can you tell me what one of the three fossil fuels is? (pause) That's right, coal is one of the most abundant fossil fuels. (The teacher writes "coal" on the chalkboard.) Jim, do you know one of the other two fossil fuels? (pause) I'll give you a clue, we use one of these types of fossil fuels in our cars. Gasoline is close, but the word I was looking for is petroleum, gasoline is made from petroleum. (The teacher writes "petroleum" on the chalkboard.) Good answer, Jim. There is one fossil fuel left, this one is often used to heat peoples' homes. Can you tell me what the name of the last fossil fuel is , Jenny? (pause) You're right it is the one on the commercial that has the little flame on it, do you remember what it is called on that commercial? (pause) Dan, can you help Jenny out with this

question? (pause) Natural gas, that's right, Dan. (The teacher writes "natural gas" on the chalkboard.) Raise your hand if you can tell me what the word fossil means. James, can you tell us what "fossil" means? (pause) Excellent answer, a "fossil" is the remains of plants or animals that are preserved in rock formations in our Earth's crust. Fossil fuels are made in much the same way that fossils are.

Get out of your seats, push your chairs in, and come to the front table. I am going to show you how fossil fuels are formed. (Teacher takes out a clear, glass pan that has a layer of soil packed firmly in the bottom of it and four containers marked "plants and animals", "sand", "rocky soil", and "molten rock".) The soil in the bottom of this pan is going to represent the surface of the Earth in our demonstration. Millions of years ago many plants and animals died on the Earth. Matt, would you take the container marked "plants and animals" and spread its contents along the surface of the Earth, please? (This container is full of leaves that form a fluffy, green layer on top of the soil.) These leaves represent the plants and animals that died on the surface of the Earth. Everyone take a look through the side of the pan and see how high the leaves go up the side of the pan. After these plants and animals died many things happened on the Earth and sand, rocky soil, and molten rock washed over the decaying plants and animals. Jane, will you come take the container marked "sand" and spread it over the surface of the Earth, please? Tom, you can follow with the container marked "rocky soil", and Annie you can go last with the container marked "molten rock". The rest of you should be observing what is happening to the decaying plants and animal matter.

What do you see happening, Donna? (pause) That's right, the plant and animal matter is packing down. When this happens over thousands of

years the plant and animal matter gets packed down very firmly and is heated by the surface of the Earth. This process forms fossil fuels. The fossil fuels that we use today were formed 390 million years ago. Since it takes such a long time for fossil fuels to form they are not a renewable resource. As soon as we use up what fossil fuels we have, we won't have any more. Now that we know what fossil fuels are and how they are formed I want you people to be detectives and find out what fossil fuels are used for. You must find at least twenty uses each and the person who finds the most uses will get to be the leader on the way to lunch today. At 10:50 everyone must be seated at their seats ready to share what they've found."

When the students return to their seats they will share what they have found with the class in a discussion and each child will write their fossil fuel uses on colored paper fossils that will be put on the bulletin board titled "Fossil Fuel Uses". To review the lesson each student will be responsible for coming up with two questions that they can use to quiz a classmate on the lesson. The students will write these questions on wipe-off cards which will be used to play a trivial pursuit type game where the students play in two teams. In this game the teams will take turns answering the questions of the opposite team.

Guidelines for Behavior. The students will be expected to behave as follows:

1) Raise your hand if you have something to say.
2) Respect your classmates and teacher by talking only when called upon and keeping your hands to yourself.
3) When working in groups, work cooperatively and quietly.
4) When using scissors, other sharp objects, and art supplies use

them in the way that they are meant to be used, for example, use paint on paper, not on your classmates, and use scissors for cutting paper only

5) In order to leave the classroom, students must have the permission of the teacher.

Materials

Soil	Leaves
Sand	Mud
Rocky Soil	Clear Glass Pan

Means of Evaluation Basic understanding of the lesson by the class for the day will be assessed at the end of the lesson during the game. At this time, if the students are having difficulty answering each other's questions the lesson will not be evaluated as successful. If the students answer most of the questions correctly it will be assumed that most of the students have a basic understanding of the lesson and the lesson will be evaluated as successful. The research assignment will be evaluated on whether or not the student has completed it by finding twenty uses of fossil fuels and put his or her results on the bulletin board.

Day Two

Date: May 5, 1992

Grade: Five

Level: All students will participate.

Topic: How Can We Provide Solutions for Some of The Effects of Fossil Fuel Depletion on Our Lives?

Time Period: 80 minutes, 10:00-11:20

Objectives: Upon completion of this lesson students will be able to explain some changes that will occur in our lives as a result of the depletion of the fossil fuel supply and identify some innovations that could be made in our lives to accommodate this problem.

Method: Lecture, Brainstorming, Group Work

Procedure: At the beginning of the lesson the students will have ten minutes to study their notes and ask questions about the material covered the day before. At the end of this review time the students will be given a short written quiz on the material covered the day before. When everyone has finished the quiz, the lesson will begin with a short lecture, as follows:

"Yesterday we talked about how the fossil fuels were formed 390 million years ago and we said that once we use them up they will be gone. Right now, the fossil fuels make up over one half of the world's energy supply, but by the year 2010, when you people are about 29 years old, less than one third of the world's energy supply will come from fossil fuels. (The teacher draws two circles on the board.) Ryan, will you come to the board and show the class what one half of this circle is, please? (pause) Thank you, Ryan. This circle shows us how much of our energy comes from

fossil fuels right now. (The teacher labels this circle 1992) Megan, will you come to the board and show the class what one third of the second circle looks like, please? (pause) Megan's picture shows us how much of our energy will come from fossil fuels in 2010. (The teacher labels this circle 2010.) The difference between the amounts shown in these two graphs will be the amount that the fossil fuel use has decreased over 18 years. The reason that fossil fuel use will decrease is because they will become hard to find. When this happens people will start charging very high prices for the fossil fuels. When high prices start being charged, fewer people will be able to use fossil fuels because they will not be able to afford them. Because of this problem we need to identify some changes that not having fossil fuels is going to cause in our lives and try to solve them."

At this time the teacher will give an example of brainstorming about what changes the lack of fossil fuels is going to have in our lives using the "uses" that the students researched the day before. For example, a solution to the problem of having no gas for our cars is to invent a car that will operate on another type of fuel. The teacher will then ask the students to divide into groups of two to four students to do the brainstorming that he or she just modeled. Each group must come up with three solutions to an effect of fossil fuel depletion. When the groups have completed this step, they will be instructed to choose one of their solutions out of which to make some type of model. When the groups have made this decision they will meet with the teacher and fill out a proposal of their project which will form the basis of evaluation of the project. This proposal will have to be approved by the teacher. When students have gained approval they may use the remaining time to work on their

projects.

Guidelines for Behavior The students will be expected to behave as follows:

1) Raise your hand if you have something to say.
2) Respect your classmates and teacher by talking only when called upon and keeping your hands to yourself.
3) When working in groups, work cooperatively and quietly.
4) When using scissors, other sharp objects, and art supplies use them in the way that they are meant to be used, for example, use paint on paper, not on your classmates, and use scissors for cutting paper only.
5) In order to leave the classroom, students must have the permission of the teacher.

Materials A variety of materials will be used depending on the projects being done.

Means of Evaluation While students are working in groups they will be observed and evaluated on how cooperatively they are working. A short review at the end of the period will be used to close the lesson. During this time the teacher will quiz the students orally on facts presented in the lecture with questions, as follows:

1) How much of the world's energy supply is supplied by fossil fuels now?
2) When will the amount of energy supplied by fossil fuels decrease to less than one third?
3) When fossil fuels become hard to find, what will happen to the price of them?
4) What are some of the effects of fossil fuel depletion going to be

on our lives?

Name:_____

Quiz One: Fossil Fuels

1) What are the three types of fossil fuels?

2) How are fossil fuels formed?

3) What are seven ways that we use fossil fuels today?

4) How many years ago were the fossil fuels that we use today formed?

Fossil Fuels Project Proposal

For which effect of fossil fuel depletion do you plan to provide a solution?

Give a brief description of what your solution to this effect will be.

How do you plan to present your solution to the class? Are you going to write a paper, build a model, etc.?

List the materials that you would like to use for your project.

Group Members:_____

_____

_____

_____

Teacher Approval:_____

Individual Evaluation

Student _____

Day One

Day Two

Day Three

Summary of Work Within Group

Teacher's Signature _____

Day Three

Date: May 6, 1992

Grade: Five

Level: All students will participate.

Topic: How Can We Provide Solutions for Some of The Effects of Fossil Fuel Depletion on Our Lives?

Time Period: 80 minutes, 10:00-11:20

Objectives: Upon completion of this lesson students will be able to identify some innovations that could be made in our lives to accommodate the effects on our lives of fossil fuel depletion.

Method: Group Work

Procedure: At the beginning of the lesson quizzes will be handed back and questions may be asked about them. We will then briefly discuss what has been covered in the previous two lessons as a review. If there are no further questions students may begin work on their individual group projects. During this time, the teacher will be available to help the students through questions and help with planning for the course of the project. At this time the teacher will also begin filling out an Individual Evaluation on each student in the class. On this sheet, the teacher will record observations about how each student is working in their group on each of the three group work days in the unit. This evaluation will be used as a basis for each students individual grade for the unit. Students will also be able to access the library and other sources in the school that they need to for their projects. Toward the end of the lesson students will be asked to clean up and think of two new fossil fuel questions. When the students have completed this, we will play the same type of trivial

pursuit game that we did in lesson one as a source of review.

Guidelines for Behavior: The students will be expected to behave as follows:

1) Raise your hand if you have something to say.
2) Respect your classmates and teacher by talking only when called upon and keeping your hands to yourself.
3) When working in groups, work cooperatively and quietly.
4) When using scissors, other sharp objects, and art supplies use them in the way that they are meant to be used, for example, use paint on paper, not on your classmates, and use scissors for cutting paper only.
5) In order to leave the classroom, students must have the permission of the teacher.

Materials: A variety of materials will be used depending on the projects being done.

Means of Evaluation: During this lesson students will be observed again by the teacher and evaluated on whether or not they are working cooperatively, time management, and how the work load is being distributed in the groups. The game at the end of the period will also serve as a means of evaluating how well the students are retaining the information.

Day Four

Date: May 7, 1992

Grade: Five

Level: All students will participate.

Topic: How Can We Provide Solutions for Some of The Effects of Fossil Fuel Depletion on Our Lives?

Time Period: 80 minutes, 10:00-11:20

Objectives: Upon completion of this lesson students will be able to identify some innovations that could be made in our lives to accommodate the effects on our lives of fossil fuel depletion.

Method: Group Work

Procedure: This will be the final day for students to wrap up their projects. On this day, students who are writing papers can use the word processor to produce a final copy and students who are building models will have access to the materials that they need to complete their models. Students must also check in with the teacher today and report how their projects are coming, whether any changes in their proposals had to be made, and whether their project will be completed on time. Students will also be instructed to use a portion of this period to practice their oral presentations in their groups so they are prepared to present their projects tomorrow. Each group member must have a part in the group presentation to the class. When the students have completed their projects they will report to the teacher who will assist them in taking pictures of their finished product (in the case of a model) or making copies of their papers. These pictures and copies will be combined in a book about the group projects called <u>New Ideas For Our Future</u>. Each group

will be required to fill out a sheet that will describe their project in the book. This book will join the rest of the "project books" in the classroom library.

Guidelines for Behavior: The students will be expected to behave as follows:

1) Raise your hand if you have something to say.
2) Respect your classmates and teacher by talking only when called upon and keeping your hands to yourself.
3) When working in groups, work cooperatively and quietly
4) When using scissors, other sharp objects, and art supplies use them in the way that they are meant to be used, for example, use paint on paper, not on your classmates, and use scissors for cutting paper only.
5) In order to leave the classroom, students must have the permission of the teacher.

Materials: A variety of materials will be used depending on the projects being done.

Means of Evaluation: On this day students will be evaluated on Individual Evaluation sheets again, as they were yesterday. The three main things that the groups will be evaluated on will be working cooperatively, time management, and distribution of the work load among the students in the group.

Look at this great idea!

Group Members _____

_____

_____

_____

Our project _____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Day Five

Date: May 8, 1992

Grade: Five

Level: All students will participate.

Topic: Fossil Fuel Final Presentations

Time Period: 80 minutes, 10:00-11:20

Objectives: Upon completion of this lesson students will be able to identify some innovations that could be made in our lives to accommodate the effects on our lives of fossil fuel depletion.

Method: Oral Presentation By Students

Procedure: Today the groups will present their final projects to their classmates. Each presentation will be videotaped so that it can be viewed by the group. At the end of each presentation students will be able to ask questions of their classmates and provide comments on things that could have been done differently in the project. For each group, the teacher will fill out a project evaluation form that will help determine the final grade of the students. The students will fill out the same evaluation form after watching the videotape of themselves. For the last 15 minutes of the period students will take a short written quiz on fossil fuels.

Guidelines for Behavior: The students will be expected to behave as follows:

1) Raise your hand if you have something to say.
2) Respect your classmates and teacher by talking only when called upon and keeping your hands to yourself.
3) When working in groups, work cooperatively and quietly.
4) When using scissors, other sharp objects, and art supplies use

them in the way that they are meant to be used, for example, use paint on paper, not on your classmates, and use scissors for cutting paper only.

5) In order to leave the classroom, students must have the permission of the teacher.

Materials:

Video Camera,

Videocassette (blank)

Means of Evaluation: The final projects will be evaluated on the following criteria: overall cooperative work, overall distribution of work load in the group, time management, neatness of the final project, whether the final project met the criteria in the proposal that was made, participation of all group members in the oral presentation, and whether the oral presentation was well organized. This grade, in combination with the quizzes and a grade based on each student's Individual Evaluation sheet will comprise each student's grade for the unit.

Name _____

Final Quiz: Fossil Fuels

1) What are the three types of fossil fuels?

2) How are fossil fuels formed?

3) What are three ways that we use fossil fuels today?

4) How many years ago were the fossil fuels that we use today formed?

5) How much of the world's energy supply is supplied by fossil fuels now?

6) When will the amount of energy supplied by fossil fuels decrease to less than one third?

7) What are two of the effects of fossil fuel depletion going to be on our lives?

Project Evaluation

Group Members:_____

_____

_____

_____

1) Did the group work cooperatively?

2) Did each member of the group do an equal amount of work?

3) Did the group work hard and manage their time well?

4) Is the final project neatly done?

5) Did the final project meet the criteria that were proposed?

6) Did all group members participate in the oral presentation?

7) Was the oral presentation well organized?

8) Are there any changes that should be made in this project?

9) Considering the above questions, what grade does this group deserve on this project?

Signature_____